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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,185	07/24/2003	Samantha S. H. Tan	59081-8009.US01	2697
22918	7590	09/13/2005	EXAMINER	
PERKINS COIE LLP P.O. BOX 2168 MENLO PARK, CA 94026			CULBERT, ROBERTS P	
			ART UNIT	PAPER NUMBER
			1763	
DATE MAILED: 09/13/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,185

Applicant(s)

TAN ET AL.

Examiner

Roberts Culbert

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2005.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15 and 38-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8-11 is/are allowed.
- 6) ☒ Claim(s) 1-7, 12, 13, 15 and 38-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/4/05, 8/29/05
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

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DETAILED ACTION

Response to Arguments

Applicant's arguments filed 7/5/05 have been fully considered.

Applicant has argued that the supplied reference teaches how the Ra parameter is used to define surface roughness. However the reference does not teach that Ra (an expression of average feature size) may be expressed as a parameter without appropriate units such as microinches or nanometers.

The amendment to the claims specifying a semiconductor manufacturing substrate is sufficient to overcome the 102(b) rejection based on Matsushita (JP 50087974).

Applicant has argued that one trying to arrive at the claimed embodiments would be dissuaded from using the Takahashi and Kiehlbauch references because Takahashi teaches coating the quartz, and Kiehlbauch is not directed towards the goal of promoting stiction of deposited layers. Takahashi is only cited as teaching a suitable drying step after a quartz rinsing step. Kiehlbauch teaches a cleaning step suitable for a quartz substrate following etching and mechanical polishing and is reasonably pertinent to quartz surface treatment by chemical etching and mechanical roughening.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 2-5, 13 and 38-43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2-5, 13 and 38-41 recite the limitation of roughness (e.g. 10 Ra, 16 Ra etc.) The average surface roughness values (Ra) are indefinite because they do not include appropriate measurement units such as microinches, micrometers or nanometers.

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,368,410 to Gorczyca et al. in view of U.S. Patent 4,957,583 to Buck et al.

Regarding claims 1, 6 and 7, Gorczyca et al. teach a method of treating a quartz substrate comprising preparing a quartz substrate to provide a working surface having an initial working surface roughness (Col. 3, Lines 10-63) and acid-etching the working surface (Col. 3, Line 64 – Col. 4, Line 19) to increase the surface roughness by at least about 10%, but less than that which would create cracks under said working surface which could result in pieces disengaging from said working surface. Note that cracks are eliminated by the etching process of Gorczyca et al. (Col. 4, Lines 7-19)

Gorczyca et al. do not expressly teach using ultrasonic etching.

However it is notoriously old and well known in the etching art to use an ultrasonicator to stir or agitate an etching solution to increase the etch rate and etch uniformity.

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For example, Buck et al. teach that it is known in the etching art to use ultrasonics in lieu of magnetic stirring to agitate an etching solution and hereby eliminate "dead spots". See (Col. 1, Line 18 – 68)

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to use an ultrasonicator to agitate the etching solution of Gorczyca et al.

One of ordinary skill in the art would have been motivated at the time of invention to use ultrasonic etching in order to uniformly etch the quartz substrate.

Although Gorczyca et al. in view of Buck et al. does not explicitly teach the roughness is increased by 10%, 25% or 50%, since the method steps of grit blasting and acid etching are the same as in the claimed invention the steps either would produce the same result, or else the result arises from essential limitations not present in the claims. Further, a direct comparison of the roughness produced in prior art references and the claimed invention cannot be made since no units are provided in the claimed invention for average roughness (Ra)

Regarding Claims 4 and 5, Gorczyca teaches that the quartz substrate is subjected to coarse grit blasting to produce an initial surface roughness using grit having a size between 1 and 800 microns. See (Col. 3, Lines 10-15). A direct comparison of the roughness produced in prior art references and the claimed invention cannot be made since no units are provided in the claimed invention for average roughness (Ra) However, it is clear that the roughness would be the same in the prior art and the claimed invention since the process (roughness increase using grit blasting) and process conditions (grit size, etc.) are the same. Further the desired roughness increase is the same in the prior art and the claimed invention since the same roughness would be necessary to produce a surface with optimal adhesion to deposits formed in a semiconductor-processing chamber.

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,368,410 to Gorczyca et al. in view of U.S. Patent 4,957,583 to Buck et al. as applied above to claims 1 and 4-7, and in further view of the applicant's admitted prior art (APA).

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Regarding Claims 2 and 3, as applied above to claim 1, Gorczyca et al. in view of Buck et al. teaches the method of the invention substantially as claimed, but does not teach that the quartz initially has an initial working surface roughness of greater than about 10 Ra or about 16 Ra.

However the admitted prior art (APA) teaches that quartz is usually manufactured with a surface roughness of about 16 Ra. (Page 2, Last Paragraph)

It would have been obvious to one of ordinary skill in the art at the time of invention to use the conventional quartz stock in order to provide a suitable quartz substrate for a deposition apparatus.

Claims 12, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,368,410 to Gorczyca et al. in view of U.S. Patent 4,957,583 to Buck et al. as applied above to claims 1 and 4-7, and in further view of U.S. Patent Application Publications 2003/0091835 to Takahashi et al. 2004/0000327 to Somboli et al. and 2004/0238487 to Kiehlbauch et al.

Regarding Claim 12, Gorczyca et al. teach that the etching process removes cracks in the surface of the quartz substrate (Col. 3, Line 64 – Col. 4, Line 20) and further teach a final cleaning process including rinsing and ultrasonicing the substrate in deionized water, (Col. 5, Lines 52-56) but does not expressly teach contacting the quartz substrate with an acidic solution of HF:HNO₃:H₂O, drying with nitrogen, and oven heating.

However the omitted treatment steps are well known in the art for preparing a quartz substrate for use. For example, Takahashi et al. teaches that it is conventional to perform a step of oven drying after ultrasonic rinsing in order to prepare a quartz substrate for use after a texturing process. It would have been obvious to one skilled in the art at the time of the claimed invention to perform oven drying in order to dry the substrate in the conventional manner.

Kiehlbauch et al. teaches that after texturing a quartz surface using mechanical polishing and etching, it is known to clean the surface with a mixture selected from HF, HNO₃, H₂O₂ etc. to remove metal contaminants from the quartz surface. (Paragraph 39) It would have been obvious to one skilled in the art at the time of the claimed invention to use an acidic solution of HF:HNO₃:H₂O in order to remove contaminants using suitable solvents.

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Somboli et al. teaches that it is preferred to perform a step of nitrogen drying after rinsing quartz with deionized water following a texturing process. (Paragraphs 87-89) It would have been obvious to one skilled in the art at the time of the claimed invention to perform nitrogen drying in order to prepare the substrate for use in the conventional manner.

Regarding the time and temperature range limitations, the references cited do not expressly teach the particular rinsing time temperatures, however, it has been held that limitations of temperature, concentrations or other process conditions of an old process do not impart patentability unless the recited changes are critical, i.e., they produce a new and unexpected result. See *In re Boesch*, 205 USPQ 215 (CCPA 1980). In this case the recited rinsing times and temperatures would have been obvious to one of ordinary skill in order to provide suitable cleaning for the quartz substrate as may be made through routine experimentation.

Regarding Claim 13, Gorczyca teaches that the quartz substrate is subjected to coarse grit blasting to produce an initial surface roughness using grit having a size between 1 and 800 microns. See (Col. 3, Lines 10-15). A direct comparison of the roughness produced in prior art references and the claimed invention cannot be made since no units are provided in the claimed invention for average roughness (Ra) However, it is clear that the roughness would be the same in the prior art and the claimed invention since the process (roughness increase using grit blasting) and process conditions (grit size, etc.) are the same. Further the desired roughness increase is the same in the prior art and the claimed invention since the same roughness would be necessary to produce the recited surface with optimal adhesion to deposits formed in a semiconductor processing chamber.

Regarding Claim 15, Gorczyca teaches micro-roughening the surface of the substrate prior to the final cleaning process by positioning a pressurized grit expulsion nozzle (Col. 3, Lines 10-63) at an angle from 30-90° and ejecting grit from the nozzle at sufficient velocity to produce a micro-roughened surface.

Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,368,410 to Gorczyca et al. in view of U.S. Patent 4,957,583 to Buck et al. as applied above to

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claims 1 and 4-7, and in further view of U.S. Patent Application Publication 2003/0000458 to Marumo et al.

Regarding Claim 44, as applied above, Gorczyca et al. in view of Buck et al. teaches the method of the invention substantially as claimed including a hydrofluoric acid etchant, but do not expressly teach the use of equal parts hydrofluoric acid, nitric acid, and hydrogen peroxide.

However, the claimed etchant mixture is a conventional quartz etchant as shown by Marumo et al. (Paragraph 64) It would have been obvious to one of ordinary skill in the art at the time of invention to use the conventional etchant since, Gorczyca teaches that any suitable quartz etchant may be used such as exposing to etching acids, plasma etc. (Col. 4, Lines 15-27)

Although Marumo et al. does not expressly teach the particular concentrations of the components, it has been held that limitations of temperature, concentrations or other process conditions of an old process do not impart patentability unless the recited changes are critical, i.e., they produce a new and unexpected result. See *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,368,410 to Gorczyca et al. in view of U.S. Patent 4,957,583 to Buck et al. as applied above to claims 1 and 4-7, and in further view of the Publication "Metal Cleaning" to S. Spring, pp 85. previously cited in applicant's Information Disclosure Statement.

Regarding Claim 45, as applied above, Gorczyca et al. in view of Buck et al. teaches the method of the invention substantially as claimed, but do not expressly teach the frequency of the ultrasonics.

However, the use of frequencies above 18 kHz (cycles per second) for ultrasonic agitation is old and well known in the art as evidenced by the Publication "Metal Cleaning" to S. Spring, pp 85. In view of the teachings of Spring, it would have been obvious to one of ordinary skill in the art at the time of invention to use frequency above 18 kHz since Spring teaches the frequencies above 16kHz such as 20-40kHz are suitable and effective for ultrasonic-type vibration and agitation.

Allowable Subject Matter

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Claims 8-11 are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art of record fails to teach or render obvious a method for treating a working surface of a quartz semiconductor manufacturing substrate comprising preparing a quartz semiconductor manufacturing substrate to provide a working surface having an initial surface roughness, ultrasonically acid-etching the working surface to increase the initial working surface roughness by at least about 10%, and *thereafter* grit blasting with a fine grit having mesh size greater than about 100 as recited in claim 8.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (571) 272-1433. The examiner can normally be reached on Monday-Friday (8:30-5:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. Culbert



**PARVIZ HASSANZADEH
SUPERVISORY PATENT EXAMINER**